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ABSTRACT

Presented in this paper are findings from research and clinical work conducted over the past seven years that support the following conclusions: "Labels are Useless," which discusses the research in relation to using labels to identify children and concludes that the issue is not the accuracy of the labels--a label is as accurate as its definition makes it--but the issue is implication; "Behaviors, Not Constructs Are Real," which contends that what teachers really see are behaviors, and what really matters to the teacher are these observed behaviors; "EBD (Etiology Be Damned)," which is based on the idea that the etiology of a child's learning problem is usually irrelevant to teaching him to read; "Laws of Learning Are More Effective Than Theories of Development," which is based on the premise that all people, learning disabled or not, are subject to certain universal laws of learning that deal with stimulus control, schedules of reinforcement, latency of response times, and so forth; and "Theories Are Not Designed for Clinicians," which contends that one of the most destructive practices in remedial education is the application of basic developmental theory to techniques of teaching. (WR)

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MINIMAL BRAIN DYSFUNCTION AND PRACTICAL MATTERS SUCH AS TEACHING KIDS TO READ

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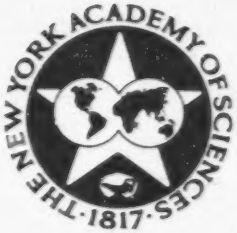

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MINIMAL BRAIN DYSFUNCTION AND PRACTICAL MATTERS SUCH AS TEACHING KIDS TO READ

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INTRODUCTION

This paper presents findings from research and clinical work we have conducted over the past seven years that support the following conclusions:

Conclusion 1: Labels are Useless

The clinical labels "minimal brain dysfunction" and "dyslexia," as well as other perceptual or neurological designations, are not particularly useful to remedial educators. Remedial education deals with children who do not perform school-related behaviors well. They may or may not have other symptoms but the reason for their referral to a special teacher is *not* their neurological condition but their inability to perform some series of tasks defined by the school as "reading." This diagnosis does not deny the existence of a broken wrist, a minor lesion in the left parietal area, or intermittent cortical suppression of an eye. But none of these conditions prevents a child from learning to read; they merely modify the problem of teaching Johnnie to read to teaching Johnnie with a broken wrist to read, or to teaching Johnnie with an apparent lesion in the left parietal area to read, and so on.

Conclusion 2: Behaviors, Not Constructs, Are Real

The difference between a learning disabled child, MBD or otherwise, and one who is not disabled is *not* his neurology but his learning behavior. A palsied child who cannot perform certain behaviors the school defines as "reading" is a disabled learner. Another palsied child who reads well is simply a good student who is, by the way, palsied. What we really see are behaviors, and what really matters to the teacher are behaviors.

Conclusion 3: EBD

The etiology of a child's learning problem is usually irrelevant to teaching him to read. Knowledge of psychosocial, psychophysical, psycholinguistic, or psychodynamic factors that preceded the behavioral condition of poor reading is usually irrelevant to methods of teaching. We call this the Etiology Be Damned (EBD) point of view.[1]

Conclusion 4: Laws of Learning Are More Effective Than Theories of Development

All people, learning disabled or not, are subject to certain universal laws of learning that deal with stimulus control, schedules of reinforcement, kinds of reinforcement, latency of response times, and so forth.

Conclusion 5: Theories Are Not Designed for Clinicians

Some findings, operants, and accidents of basic research in child development have direct practical implications for remediating learning disabled children. But the major conclusions of this research rarely do, and the basic models tested by the research almost never do. If the major conclusions of a research study have direct implications to remedial techniques, chances are that the study represents "action" rather than "basic" research. One of the most destructive practices in remedial education is the application of basic developmental theory to techniques of teaching.

These five conclusions apply to remedial education. They do not apply to the practice of medicine or to attempts to prevent learning disabilities.

The Case for Conclusion 1: Labels are Useless

Cohen [2] reports a study of the behavioral deficit patterns of middle class compared to lower class children. The study compared the learning disability patterns of a category of children known as "disadvantaged" with a variety of middle class retarded readers who were diagnosed by referral sources as "dyslexic" or "learning disabled" or "minimally neurologically impaired" or "perceptually dysfunctioning." The analysis of test data showed no differences among the groups except for the relationship between the first two subtests of the Wechsler Intelligence Scale, indicating SES as the differentiating factor. Specifically, low SES children tended to have higher Comprehension than Information subtest scores, whereas the pattern was reversed for higher SES children.

The behavioral patterns were the same regardless of diagnostic label. All 60 cases in the study were treated at a university reading clinic. That treatment involved defining precisely what each child had to learn and teaching it to him if the child seemed to learn it well, or avoiding it if he did not seem to learn it well. To know that X% of MBD children never learn to blend phonemes into words does not tell the clinician whether or not Johnnie, who has been labeled MBD, cannot learn to blend phonemes. The label does not aid the remedial specialist. More often than not, the label prejudices the remedial teacher who has been propagandized by the ancillary professions that find the diagnostic labels useful.

In a recent study of 2250 severely retarded, economically deprived children across seven county school systems, we found no pair of children with the same set of behavioral deficits in reading. This population included all kinds of special education categories, including perceptually handicapped, mentally retarded, nutritionally deficient, neurologically impaired, and so forth. The students were subjected to an individualized prescribed pedagogy based on

behavioral objectives in reading. When teaching is defined as engineering the mastery of specific, operationally described behaviors of reading, and when children are diagnosed on each of these behaviors, not only the ambiguous constructs of "MBD" and "perceptual dysfunction," but the equally ambiguous constructs of "vocabulary" or "comprehension" become useless. We end up with an individual child who can or cannot perform a specific behavior under certain conditions, and who does or does not learn that behavior as a result of our instruction. If he does not learn the behavior, we assume that our instruction was ineffective; we do *not* assume that the child is "defective."

The literature abounds with diagnostic studies of low SES populations demonstrating, in effect, that learning disabled suburban whites and disadvantaged blacks display the same behavioral deficit patterns. Simply labeling a low SES black child "disadvantaged" does not eliminate the fact that he is often the same as the white child the neurologist calls "minimally dysfunctioning" or the psychologist calls "perceptually dysfunctioning." Labels aside, look at the research.[2-7] Blow away the verbal smoke screen, "disadvantaged," and we have the MBD child and all the other clinical types. Blow away the verbal smoke screen, "MBD" and other labels, and we have a child who does or does not perform a specific behavior under specific conditions.

Let us consider curriculum research. In their beginning reading research project, Harris and Serwer reported third grade inner-city children at grade level.[8] These are the low SES, MBD, learning disabled, perceptually dysfunctioning children—minus the official labels—who suddenly read on grade level not because of neurological treatment, perceptual training, or mass psychotherapy, but because of a slight improvement in the quality of traditional classroom instruction. Cohen reports again and again the successful results of intensive instruction with these populations.[9-11] Engelmann's direct teaching methods, a kind of intensive direct pedagogy, show similar results.[12]

The issue is not the accuracy of the labels. A label is as accurate as its definition makes it. The issue is *implication*. Johnnie is MBD; assume it is accurate. But from the remedial teacher's point of view, who cares?

The Case for Conclusion 2: Behavior, Not Constructs, Are Real

Psychoeducational research is usually performed by professionals trained in hypothetical constructs, sophisticated terminology, and word games. These abstractions define professional boundaries and actually contribute to vocational security. As a result, many researchers, practicing psychologists, and educators come to believe in the reality of their professional jargon. As Barrett says, they have banished themselves to tight little verbal islands almost out of touch with reality.[13]

Not only do they talk about, but they actually believe in such "real" things as "intelligence," "perception," "cognition," "affect," and so forth. They talk about "self concept" and "reading ability" as if they really exist. They forget that concepts and constructs are not existentially real—behaviors are real, but constructs are mental structures.

A couple of years ago a doctoral student announced her intention of investigating the relationship between laterality and reading achievement. One of the doctoral committee members was delighted with the idea of a study testing a "perception" model. The operational definition of "perception" was to have

been a set of tasks matching certain geometric shapes in isolation and in series. The unique feature of the study was the hypothesis that given the specific perceptual theory, retarded readers were more likely to reverse geometric shapes in a series than isolated geometric shapes. "Laterality" was the construct used to label a certain perceptual faculty responsible for the reversal of these shapes.* The professor and advisee were slightly deflated when I presented them with similar previous research and announced that I was unimpressed with the prospects of a .40 correlation showing a relationship among operants involving geometric shapes and certain reading behaviors. I would have been surprised *not* to find a relationship of such magnitude. On the other hand, I was willing to accept a study in which the stimuli were letters, but letters without cognitive value, in order to be sure we were dealing with "pure perception"—not an impossible demand if Gibson's letter-like nonsense forms are used.[14] Since I was the major adviser, I prevailed. The study was done, and the correlation between reversal of letter-like forms in a series and a reading task was in the mid- to high-.60's, which is a dramatically high correlation.[15] The committee member was ecstatic—so ecstatic that he is publishing the paper with the student, interpreting the results as an exciting validation of a perception theory to explain reading retardation.

This is an excellent example of how a belief in the reality of a construct blinds the researcher to the significance of the behavior. In the first place, one does not need a .65 correlation to validate a theory. A .35 to .45 is quite ample. This had already been demonstrated in previous research—*of course* perception underlies reading, but that is a statement about an abstraction. What really matters is not the statement of a construct, but the nature of the stimulus as well as the actual operants involved. That is, perception in other studies was a set of behaviors involving geometric shapes. Perception in this study was a set of behaviors involving letter-like shapes. The former yielded correlations of the usual magnitude; the latter gave us unusually high correlations. Let us not deprive a theoretical construct of its due; such constructs as part of a theory generate possible researchable variables and operants. But in the remedial reading room, the *nature* of those variables and operants is what really counts.

Behavior is a term we use to describe operations performed under specific conditions. In the Netzer study, the researcher decided to call one set of operations "perception" and another set "reading." Whatever constructs she chose to use, the fact was that her study really compared Behavior 1 with Behavior 2:

> **Behavior 1:** Given X stimuli under Y conditions in Z time, subject performed operations A, B, and C.
> **Behavior 2:** Given the list of words, Z, under conditions P, subject orally recited each word in ten seconds or less from the time of presentation of stimulus.

What is "pure perception"? What is "reading"? Behavior 1 is "pure perception." Behavior 2 is "reading."

Now from the remedial teacher's point of view, what is "minimal brain dysfunction?" What is "dyslexia"? What is "learning disability"?

* Who said faculty theories of psychology died out in the 18th century?

The Case for Conclusion 3: EBD

The "Etiology Be Damned" point of view states that a remedial educator deals with presenting behaviors, not medical or psychosocial histories.[1] Furthermore, knowledge of etiology is irrelevant to remedial educational treatment. For example, a child whose history suggests neurological impairment and whose etiology in conjunction with presenting symptoms leads a neurologist to label the child "neurologically impaired," may or may not be a retarded reader. What matters to a reading teacher is not his neurological history, but his presenting symptoms. If the child is a retarded reader, nothing in the child's history should influence the remedial reading treatment. The etiology may matter to the M.D., but it is irrelevant to the Ed.D. or Ph.D.

The same is true when the etiology is psychogenic rather than psychophysical. If a remedial educator needs to know that a child's neurotic attraction to males is a correlate to a fatherless home before that educator can understand and modify the neurotic behavior, then the educator is both insensitive and incompetent. A therapist's sensitivity is a quality of his interactions with others; it is not, and should not be, a product of his knowledge of etiology.

Knowing the history of the development of a behavior adds nothing to the management of that behavior from a behaviorist's point of view, which is the perspective of every remedial educator, whether or not he admits it. Knowing that reading retardation can be traced in part to prenatal, perinatal, or postnatal psychophysical or psychodynamic factors does not, nor should it, influence what the educational therapist does to a child. The presenting behaviors and the stimuli that trigger these behaviors *now* are the relevant factors. Etiology is the educational therapist's cop out.

John is a ten-year-old retarded reader whose history shows a breech birth in nine hours of labor, early evidence of developmental abnormalities, hyperactivity, poor performance on WISC Block Design, poor quality Bender Gestalt, and a six-year-old perceptual age on the Frostig test. "MBD," says the neurologist after his exam. The history is important to the neurologist's diagnosis, for the history reinforces his impressions of the presenting behaviors. And now having assigned a medical label that depends upon etiology, the neurologist's treatment is prescribed. One could question whether or not the treatment is *really* dependent upon etiology in many cases, but that is not an educational psychologist's business; that is the M.D.'s problem. Now the remedial educator who thinks etiology matters decides to treat John's perceptual-motor deficits in order to build a base for teaching John to read. What does the research show?

Essentially, the research shows that perceptual motor training results in changes in the behaviors that are trained. Unless those behaviors are reading behaviors, the perceptual motor training does not produce better reading achievement.[18, 4]

This finding brings us back to Conclusion 2: behaviors, not constructs, matter. Teach a child to draw triangles and walk balance boards and you will perceive improvement in his triangles and in his gait, but not in his perceptual motor "faculty," and certainly not in his reading.

The EBD conclusion applies to remedial educational treatment. It does *not* apply to prevention. Nor does it necessarily apply to medical problems from a medical point of view, although neurologists and psychiatrists might find this conclusion useful in many cases.

The Case for Conclusion 4: Laws of Learning

How does learning occur? That is the major concern of the remedial educator. Whether or not the child is labeled MBD, certain principles of behavior apply. We have found six of these principles most important in designing intensive instructional strategies:

1. The consequences of behavior control behavior. The human organism operates upon the environment because of the contingencies of that operation. Control the contingencies, and you control behavior. Genes interacting with environment determine behavior, but conscious manipulation of contingencies can control predetermined behavior. This may be the single most universally accepted principle of human behavior. It is especially accepted by anti-Skinnerians, albeit unwittingly. Bruner, for example, attacked this Skinnerian principle in a widely read *New York Times Sunday Magazine* feature.[17] Ironically, the cover picture and accompanying article describes a Bruner experiment in which an electrical device hooked to a neonate's sucking muscles controls the sharpness of a TV picture, so that the amount of sucking (*determined* behavior) is controlled by the contingency—the need to have a sharp TV image. Bruner's experiment is a nearly perfect demonstration of the Skinnerian principle.

2. Attentiveness to the learning task ("motivation") is controlled by the speed of feedback (contingency) and by the schedule of feedback. If every response to a learning stimulus or every operation upon the environment leads to immediate feedback as to the adequacy of the response or operation, the learner increases his attentiveness to the task. Real life does this "naturally." Almost every human operation upon the environment receives immediate feedback. One flicks a light switch and the room is lit or darkened. One presses and moves his pen on a page, and the expected squiggles appear. How annoying it is when the feedback is delayed or when the expected or sought-after feedback does not appear. Yet in most traditional school environments, feedback is delayed. When the next learning stimulus is hooked to the immediate feedback, and this process is chained in an instructional sequence, the result is "high intensity" instruction with high pupil participation.[18] Thus, the time schedule of feedback, its speed, controls the intensity.

3. The level of the learning task must be such that the learner can anticipate a high probability of positive feedback.[19] A child, MBD or not, is a human being, and normal people avoid aversive reinforcement (feedback). One would need to be pathological to seek a negative contingency continuously. Yet many classrooms and some clinicians persist in presenting environments to children when they know that interaction with those environments must lead to negative feedback. The trick of good pedagogy is, of course, to rig the process so that the learner is always "right" or successful.

4. Tight stimulus control is crucial to efficient learning. Exactly what is the learner responding to? More often than we think, a learner makes the correct or adequate response because he is operating under an incorrect stimulus control. For example, since 1965 we have watched commercially published linear programmed instruction booklets in reading manipulate children into correct responses to the wrong stimuli. In one widely used programmed reading book, for example, a series of frames lead to a behavior requiring the subject to print, S H I P in a blank space. Most children make the adequate motor encoding response, but about 25% of them are likely on request to

respond orally, "boat." This answer indicates that the subject's motor encoding behavior is a response to the wrong cue. Careful stimulus control is crucial to effective instructional programming.

5. Learning must be modular. MBD or not, children like to get a feeling of closure. That closure should usually receive official recognition, some extrinsic sign of recognition—in its simplest form, a notation on some type of progress plotter. Designs for instructional programs thus require short-range goals, daily or weekly at most.

6. Whatever is to be learned must be reinforced (rewarded). Too often, a teacher presents item A to a learner contiguous to one or more other items. Item A is the object of the mini lesson; the response to it is reinforced. But the teacher expects the child to remember or perform items B, C, D, and so forth. If we present, for example, information that block, black, back, dock end with the same sound, and responses by the pupil to the ck sound are reinforced, we cannot expect that the child will have also learned something about the bl blend. He was taught the ck sound, for that was the crucial element in the stimulus condition and the one to which the response was reinforced. He was merely exposed to bl, and there is a world of difference between teaching and exposing a student to something.

These six principles do not operate individually; they interact. Feedback (principle 1.) should be paced and immediate (principle 2.) and positive (principle 3.). This feedback should reinforce the appropriate stimulus condition (principle 4.) in short learning modules (principle 5.). When these principles are not applied to a specific response, one cannot expect learning to occur (principle 6.).

These principles of learning are certainly not the only ones involved in teaching effectively. But they are the most important principles, and they are universal. Peculiarities of individual learners do not make these principles irrelevant. No matter what we teach to whom, these six principles underly effective pedagogy. The problem facing the classroom or clinic teacher with normal or disabled learners is not one of know-how. These principles supply the know-how. The problem is engineering. "What combinations of human and material resources designed and deployed in what configurations do I need to apply these principles?" asks the teacher. This is an engineering problem that is one-half of the process known as "curriculum design." (The other half is operationally defining what to teach.) Although I enjoy and indulge in research that aims at refining those principles (basic educational research), the greater social need is on the engineering end. Some of you who are familiar with our High Intensity Learning Systems will appreciate our efforts toward the latter.[20]

Let us look at an example of research in know-how and engineering application. In investigating effects of extrinsic versus intrinsic contingencies relative to level of difficulty of task, Mueser[19] found that intrinsic rewards were as effective as extrinsic rewards when the task was within the child's learning level. When the level of difficulty of the task to be learned was unreasonable, extrinsic rewards, in effect, kept the child from "climbing the walls" just long enough to cause him to learn a little more than the child who was not extrinsically rewarded under the same conditions. This is an example of basic educational research contributing to the validation of principle 3. above.

In the same study, we were faced with a curriculum problem: In order to test the effects of level and type of reward, what learning task should we teach

and how? This is a curriculum problem; the *how* is the engineering aspect of it. To answer the curriculum problem, we had to apply the six principles above, and the results of this application have direct bearing on the teaching of children labeled MBD. The population used in the Mueser study consisted of 160 severely disadvantaged, black, urban five-year-olds in Norfolk, Virginia. In this kind of population, the research shows again and again a high incidence of the kinds of dysfunction usually labeled MBD.

Given four fifteen-minute sessions in which to learn to discriminate letters involving simultaneous presentation of a stimulus letter, b, for example, and three or more foils, one of which matched the stimulus, we gradually increased the complexity of the task by reducing the size of the stimulus and increasing the complexity of the background. Using materials that apply the above-mentioned principles and using group instruction, we found that 77 out of 80 children working at their appropriate levels learned the task to criterion level as measured by pre-post and rote assessments.

What explains the three children who did not learn the task? Our explanation would be faulty engineering. It would not be "learning disability." In plain language, we failed with three. Indeed, Mueser herself reports that the three children who failed did not understand the mechanics of the procedure; had she violated the experimental conditions and sat for a minute or two with each one to explain the task, she felt all 80 would have learned it. Given the research on the incidence of visual perceptual dysfunction in this kind of population, however, the expected failure rate should have been as high as 40.[11]

To digress a moment and return to Conclusion 1: Some day, pedagogy in general may be as good as it could be, as demonstrated rather simply in Mueser's study. At that time, most children with or without neurological symptoms will be reading adequately, and three will not. And at that time, I might be willing to accept a special label for the few who do not learn to read. I suspect, nevertheless, that whatever label we give them, its operational definition will be "the pedagog's failure to teach three children who, incidentally, have X symptoms that are not unique to those three." What many medical and psychological specialists in this field do not seem to appreciate is just how ineffective most teaching methods are, in general, and how much better they could be if we engineered the know-how.

The Case for Conclusion 5: Theories Are Not Designed for Clinicians

The basis of traditional research is theory. Given a set of empirical observations, intellectual man mentally links these real-world observations through what appear to him to be logical relationships. He invents constructs or abstractions or labels to help rationalize the logic of the structure. In the end he has a theory. He then proceeds to test against reality the relationships among the variables in his theory, using ingenious designs to reduce observer bias. Alas, having spent decades training themselves in this process, some researchers begin to believe that the theory is a real-world rather than a mental entity—a sort of "rational rationalization." Worse, some professionals begin to think that the constructs are real. This delusion was discussed above, in The Case for Conclusion 2. Still worse, a number of clinicians trained by theorists assume that theories can be, and even should be, applied to clinical practice. This assumption is usually dangerous, as well as absurd. A theory explains

how a child naturally learns language, but this is not usually the best way to teach him formally. A Piaget model of cognitive development is not a clinical model for treatment. If the basis of higher cognitive functions is perceptual motor activity, which is essentially what contemporary child development theories tell us, it does not follow that we remediate reading (a higher cognitive function) by having a 12-year-old crawl or walk a balance beam.

Laws of learning are a much better source of guidance for teaching children than theories of development. Indeed, I have lately been tempted to advocate the elimination of child development courses from teacher training as a desperate attempt to halt the absurd application of theory to practice. Of course, basic research of a theoretical model should influence clinical practice, but that influence usually is derived from findings and procedures, not directly from the application of theory.

For example, one element in a theoretical model of visual perception development in young children was supported by a significant body of empirical data. That element was the theory that younger children's perception is dominated more by the vertical than by the horizontal.[22] Hyman [23] tested the theory a number of ways, one of which involved the printing of b p d q's with the humps in much bolder face than the verticals. Her hunch was that the differences in the density of ink used for the hump and the vertical of each letter would offset the dominating tendency of the vertical and verify her hypothesis that the vertical distracts the child from the direction and placement of the hump. The results were startling. Letter reversals in kindergarten children, whose "laterality" and "directionality" processes are relatively primitive, were reduced markedly. The study did not refute theories based on the constructs of "body image," "laterality," and so forth. In fact, one could make a case that the study supports that theory. But the study suggests a clinical method of reducing b p d q reversals. That method does not, however, apply the theory, which would have children developing good laterality for months or years before they would stop reversing letters. Instead, one procedure in Hyman's study accidentally provides us with a direct, precise method: slightly bend out (fade out) the vertical and leave the hump in bold face. For clinicians, the value of research is usually of this indirect nature.

Conclusion

In general, insiders know very little about technologies for teaching children to read, and outsiders know very little about what the insiders don't know. Insiders are classroom teachers, remediation specialists, and psychoeducational diagnosticians. Outsiders are the lay public and service professionals ancillary to education: social workers, psychotherapists, neurologists, and pediatricians. Each group feeds the other's ignorance.

On the one hand, medical practitioners and researchers assume that classroom and remedial education specialists *ordinarily* are effective, since most children manage to read and write well enough. Thus, the minority of children who do not achieve in school must be victims of psychosocial, psychophysical, psycholinguistic, and/or psychodynamic factors. What a shock it is, indeed, for outsiders to discover that most children learn to read in spite of, not because of, their formal instruction. Common pedagogical practices have not even scratched the surface of existing pedagogical know-how. We know about be-

havior modification techniques, but we have hardly used them. Why resort to more drastic measures such as chemotherapy and perceptual motor training when we have not exhausted pedagogical remedies?

To put it bluntly, most psychoeducational specialists do not design the technology or engineering necessary to apply the principles of learning that are available to us. Schools of education do not harbor very many educational technologists, which is what curriculum specialists really should be. If they did design those technologies, then chemotherapy and perceptual motor techniques would be wisps of wind lost in a storm of powerful teaching methods. Most learning disabled children would be reading and writing adequately, with or without brain lesions. A few, far fewer than currently labeled as such, might be ripe candidates for Ritalin, and balance boards, and hypnosis, and megavitamins, and bitter herbs, and whatever else you might want to try.

Insiders cannot bear to face their own failures, so we look elsewhere for explanations. Outsiders, concerned over children who, among other things, do not achieve in school, associate those "other things" with the underachievement and provide convenient explanations to cover the insiders' failures. Those explanations are supported by *ex post facto* research designs that generate statistical correlations of .30 to .50. Such designs prove very little, and such magnitudes simply support what we already know—that negative human characteristics correlate with negative human characteristics—or its reverse: Good things come in bunches. The whole field of education, but in particular the education of children who do not achieve as well as we think they ought to (which is the only operational description that seems to define a learning disabled child) is plagued by correlational *ex post facto* studies that pose as evidence of cause and effect relationships between neurological and perceptual factors and school achievement.

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